

**Notice of Allowability**

Application No.

10/756,564

Applicant(s)

BORG ET AL.

Examiner

Art Unit

Arnold Castro

3747

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Telephone interview September 29, 2005.
2. ☒ The allowed claim(s) is/are 1-18.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)                      |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                              |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance                        |
|   | 9. <input type="checkbox"/> Other _____  |

### **EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Douglas W. Sprinkle Reg. No. 27,394 on September 29, 2005. No extension fees are required.

The application has been amended as follows:


Replace claims 1-18 with attached amended claims 1-18

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnold Castro whose telephone number is (571) 272-4839. The examiner can normally be reached on Mon, Tues, Wed, Thurs 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yuen Henry can be reached on (571)-272-4856. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Arnold Castro  
Examiner  
Art Unit 3747

AC



Henry C. Yuen  
Supervisory Patent Examiner  
Group 3700

### **AMENDMENTS TO THE CLAIMS**

1. (Currently Amended) An engine startup fuel control system for use with an internal combustion engine of the type having at least one combustion chamber, an intake air passage fluidly connected each combustion chamber, a source of fuel, a crankshaft and a camshaft, said fuel control system comprising:

a multipoint fuel injector associated with each combustion chamber, each multipoint fuel injector having an inlet connected to said fuel source and an outlet fluidly connected to said intake air passageway adjacent its associated combustion chamber,

a crankshaft position sensor which generates an output signal representative of the angular position of the crankshaft,

a camshaft position sensor which generates an output signal representative of the angular position of the camshaft,

an engine control unit programmed to determine the synchronization of the engine in response to said output signals from said crankshaft position sensor and said camshaft position sensor,

said engine control unit having outputs which control the activation of each said multipoint fuel injector,

said engine control unit programmed to calculate the amount of fuel to achieve a predetermined air/fuel mixture for each cylinder and to vary the activation of each said multipoint fuel injectors after the determination of engine synchronization after initiation of crankshaft rotation to achieve [[a]] said predetermined air/fuel mixture in each of said combustion chambers.

2. (Original) The invention as defined in claim 1 and comprising a cold start fuel injector having an inlet connected to said fuel source and an outlet fluidly connected through a cold start passageway with each combustion chamber, said engine control unit having an output which controls the activation of said cold start fuel injector.

3. (Original) The invention as defined in claim 2 wherein said ECU determines the air/fuel mixture introduced by said cold start fuel injector into each combustion chamber during startup.

4. (Original) The invention as defined in claim 1 wherein the engine control unit is programmed to begin activation of said multipoint fuel injectors only after a predetermined rotary speed of the main shaft during engine startup.

5. (Original) The invention as defined in claim 1 and comprising means for storing said crankshaft position sensor output signal and said camshaft position sensor output signal in memory storage means at engine shutoff.

6. (Original) The invention as defined in claim 5 wherein said engine control unit determines synchronization of the engine by reading said stored crankshaft position sensor output signal and said stored camshaft position sensor output signal from said memory storage means.

7. (Original) The invention as defined in claim 1 wherein said internal combustion engine is a four-cycle internal combustion engine.

8. (Currently Amended) An engine startup fuel control system for use with an internal combustion engine of the type having at least one combustion chamber, an intake air passage fluidly connected each combustion chamber, a cold start fuel passageway having an inlet and an outlet, the cold start fuel passageway outlet being fluidly connected to the combustion chambers and a source of fuel, said fuel control system comprising:

a crankshaft position sensor which generates an output signal representative of the angular position of the crankshaft,

a camshaft position sensor which generates an output signal representative of the angular position of the camshaft,

a multipoint fuel injector associated with each combustion chamber, each multipoint fuel injector having an inlet connected to the fuel source and an outlet fluidly connected to said intake air passageway adjacent its associated combustion chamber, each said multipoint fuel injector, upon activation, injecting fuel into its associated combustion chamber,

a cold start fuel injector having an inlet connected to said fuel source and an outlet fluidly connected to the inlet of the cold start fuel passageway, said cold start fuel injector, upon activation, introducing a fuel charge into the inlet of the cold start fuel passageway,

processing means programmed to calculate the amount of fuel to achieve a predetermined air/fuel mixture for each cylinder and to determine the synchronization following initiation of crankshaft rotation of the engine in response to said output signals from said crankshaft sensor and said camshaft sensor and for producing [[a]] said predetermined air/fuel combustible charge

in each combustion chamber during engine startup by selectively activating said multipoint fuel injectors during engine startup and after engine synchronization to provide fuel to each combustion chamber sufficient to compensate for any transport delay of the fuel charge from the cold start fuel injector through the cold start fuel passageway.

9. (Original) The invention as defined in claim 8 wherein said processing means initiates activation of said cold start fuel injector and said multipoint fuel injectors at a predetermined rotational speed of said main shaft.

10. (Original) The invention as defined in claim 8 and comprising means for storing said crankshaft position sensor output signal and said camshaft position sensor output signal in memory storage means at engine shutoff.

11. (Original) The invention as defined in claim 10 wherein said engine control unit determines synchronization of the engine by reading said stored crankshaft position sensor output signal and said stored camshaft position sensor output signal from said memory storage means.

12. (Original) The invention as defined in claim 8 wherein said internal combustion engine is a four-cycle internal combustion engine.

13. (Currently Amended) A method for managing fuel delivery in an internal combustion engine having multiple combustion chambers during engine startup, said engine

having a crankshaft, a camshaft and a multipoint fuel injection associated with each combustion chamber, said method comprising the steps of:

determining the angular position of the crankshaft after initiation of crankshaft rotation,

determining the angular position of the camshaft,

thereafter calculating the required activation of the multipoint fuel injectors to achieve a predetermined air/fuel mixture in each said combustion ~~chambers~~ chamber as a function of the angular positions of said crankshaft and camshaft, and

thereafter selectively activating said multipoint fuel injectors in response to said calculating step to achieve said predetermined air/fuel mixture in ~~at least one~~ each said combustion chamber.

14. (Original) The invention as defined in claim 13 and comprising the steps of storing said angular position of said crankshaft and said camshaft in memory storage means at engine shutdown.

15. (Original) The invention as defined in claim 14 wherein said calculating step comprises the step of reading said stored angular positions from said memory storage means.

16. (Original) The invention as defined in claim 13 wherein the internal combustion engine includes a cold start fuel injector and comprising the step of activating the cold start fuel injector after the engine crankshaft exceeds a predetermined rotary speed.



17. (Original) The invention as defined in claim 13 wherein said activating step comprises the step of activating the multipoint injectors during an intake stroke of the combustion chamber.

18. (Original) The invention as defined in claim 13 wherein the engine includes a cold start fuel injector and comprising the step of activating the cold start fuel injector when the rotational speed of the engine exceeds a predetermined amount.